Technical Note

# Submeniscal Portal for Horizontal Cleavage Tear with Parameniscal Cyst of the Lateral Meniscus

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**Abstract:** Horizontal cleavage tears of the medial and lateral meniscus can be difficult to treat using the standard anteromedial or anterolateral arthroscopy portals. In this Technical Note, we present a new surgical technique to better manage the inferior leaflet of horizontal cleavage tears of the medial and lateral meniscus and their associated parameniscal cysts.

Debridement of meniscal tears can have varying difficulty depending on the location and type of tear. The standard anteromedial and anterolateral portals are the mainstay portals of knee arthroscopy; however, inappropriate instrument trajectory through these portals can lead to articular cartilage damage.[1,2] Accessing tears of the anterior horn of the lateral meniscus or the inferior leaflet of the meniscus can prove difficult from the anteromedial portal.[1,3] The purpose of this Technical Note is to describe an arthroscopic portal that allows easier access and improved debridement of difficult or complex tears of the medial and lateral meniscus. The submeniscal portal decreases the risk of iatrogenic articular cartilage damage and provides more complete access to the menisci and associated parameniscal cysts.

## Technique

The patient is placed supine on a standard operative table and anesthetized using general anesthesia. A tourniquet is placed around the proximal thigh and the operative leg is placed in an arthroscopic leg holder (Mizuho OSI, Union City, CA). The operative leg is prepared with preoperative skin prep solution from the midthigh to the foot and is then draped in the usual

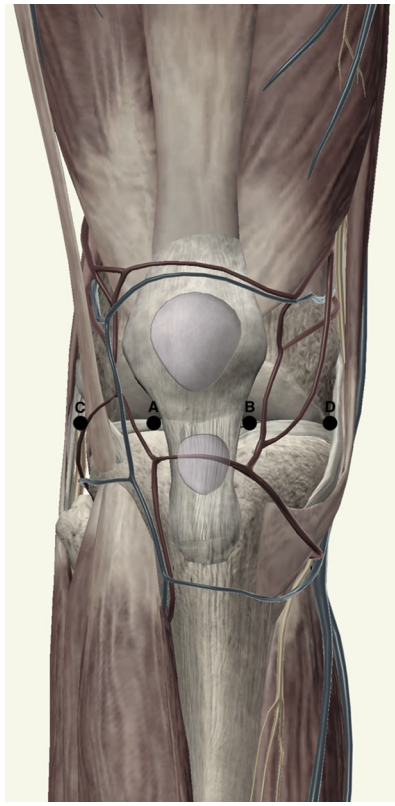


**Fig 1.** Anterior view of the right knee. (A) Anterolateral portal. (B) Anteromedial portal. (C) Lateral submeniscal portal. (D) Medial submeniscal portal.

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*The authors report the following potential conflicts of interest or sources of funding: J.L.C. reports personal fees from Arthrex, outside the submitted work. Full ICMJE author disclosure forms are available for this article online, as supplementary material.*

*The investigation was performed at Advanced Orthopaedics and Sports Medicine.*

*Received November 27, 2017; accepted January 18, 2018.*

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*2212-6287/171456*

*https://doi.org/10.1016/j.eats.2018.01.006*

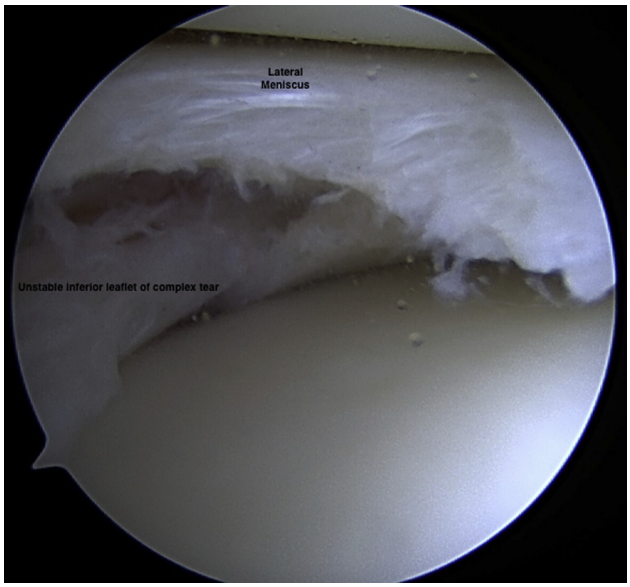


**Fig 2.** Horizontal cleavage tear of the lateral meniscus before debridement, viewing from the anteromedial portal of the right knee.

sterile fashion. This procedure uses 3 to 4 portals: the standard anteromedial (Fig 1B) and anterolateral portals (Fig 1A), in addition to the lateral submeniscal portal (Fig 1D) and/or the medial submeniscal portal (Fig 1C). The anterolateral portal is created using a No. 11 blade (Braun Medical, Bethlehem, PA) to make a vertical incision adjacent to the lateral border of the patellar tendon at the level of the joint line. The knee is then entered using a blunt trocar and scope sheath (Arthrex, Naples, FL). The trocar is replaced with the 30° 4.0-mm arthroscope (Arthrex) and a complete diagnostic arthroscopy is performed, inspecting for associated chondral damage, loose bodies, or meniscus tears (Fig 2). A 22-gague spinal needle (Braun Medical) is used to localize the anteromedial portal under arthroscopic visualization, and an incision is made in the same vertical fashion. While viewing from the anteromedial portal, the patient's leg is placed in the figure-4 position and a 22-gauge spinal needle is used to needle-localize the lateral submeniscal portal (Fig 3A), while taking care to avoid the neurovascular and adjacent ligamentous structures. A blunt trocar is then used to dilate the tract to the lateral meniscus, and this is then replaced by the 4.0-mm shaver (Arthrex) (Fig 3B-D). The shaver is used to debride the unstable inferior leaflet of the meniscus tear, which would otherwise not be reachable through the standard anteromedial portal. The lateral meniscus after

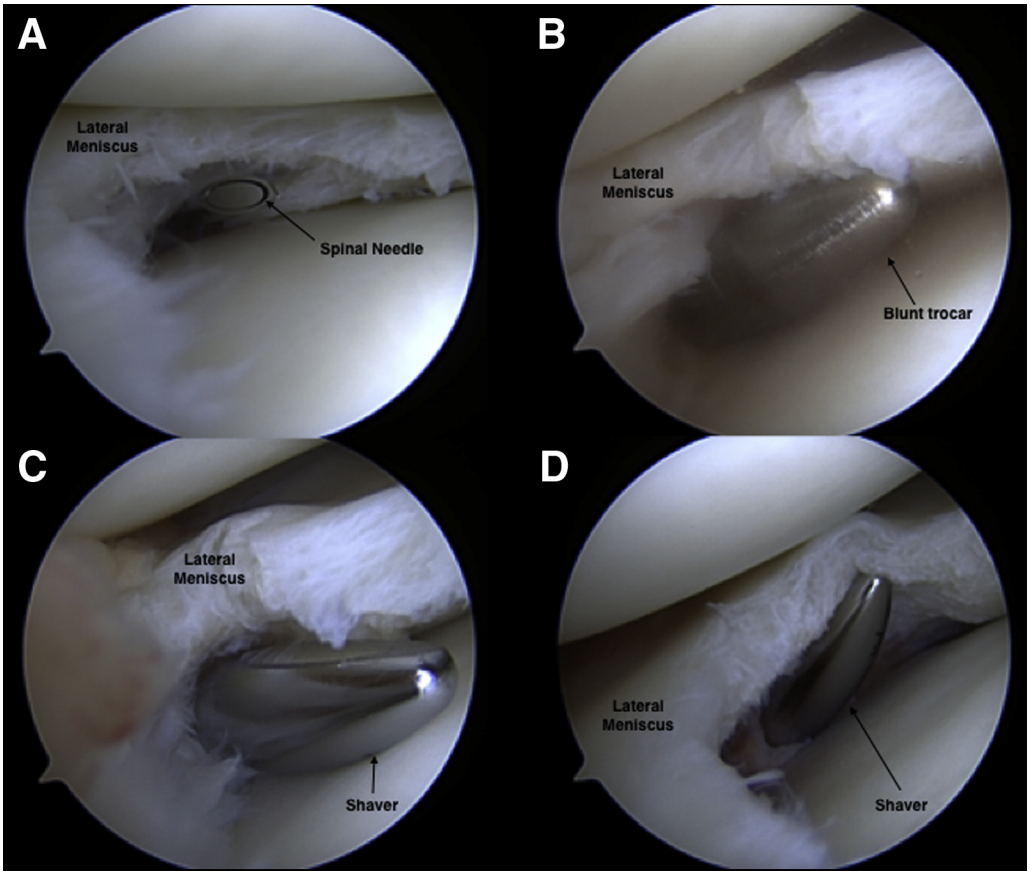


**Fig 3.** Viewing from the anteromedial portal of the right knee: (A) Needle localization of the lateral submeniscal portal. (B) Blunt trocar placement to develop tract for shaver. (C and D) Debridement of the unstable inferior leaflet.

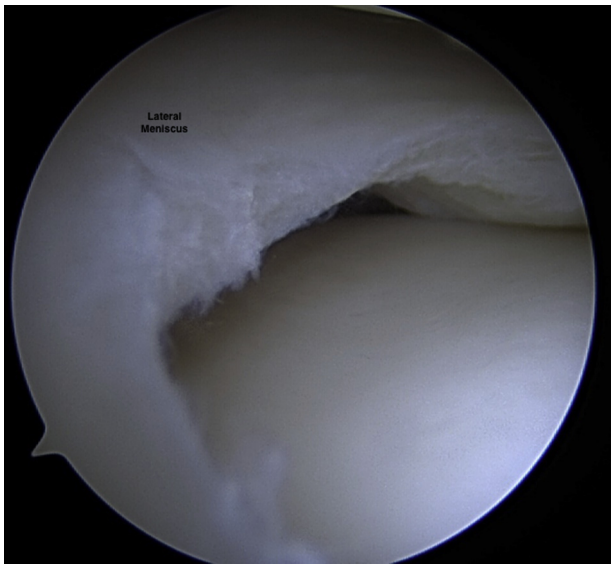


**Fig 4.** Horizontal cleavage tear of the lateral meniscus after debridement, viewing from the anteromedial portal of the right knee.

section of the unstable inferior leaflet is shown in Figure 4. These aforementioned steps are demonstrated in Video 1. The same procedure can be performed on the medial side, with the knee in 90° of flexion. While viewing from the anterolateral portal, a 22-gauge needle can be used to needle-localize the medial submeniscal portal (Fig 1C), while also taking care to avoid important neurovascular structures. A blunt trocar can then be used to dilate the tract and replace with the 4.0-mm shaver to resect an unstable inferior leaflet of the medial meniscus.

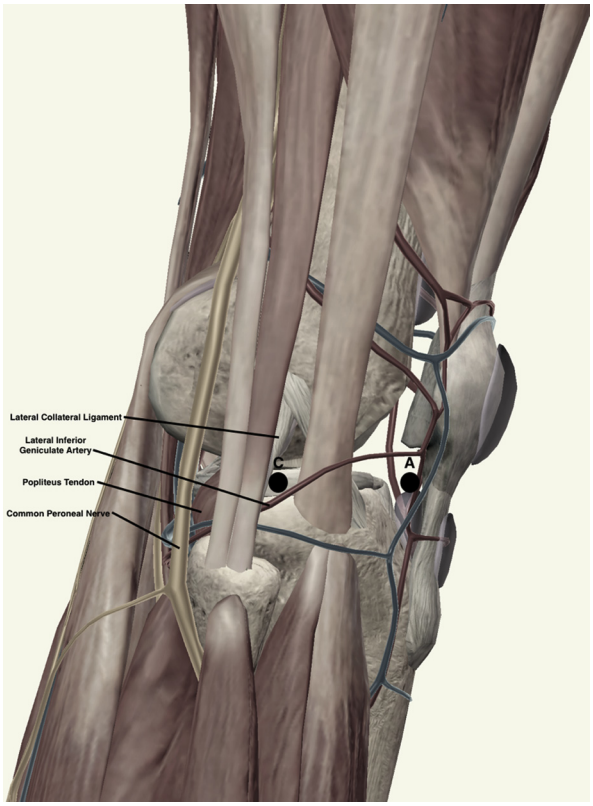


**Fig 5.** Lateral view of the right knee demonstrating anterolateral (A) and lateral submeniscal (C) portals, with anatomic considerations labeled.

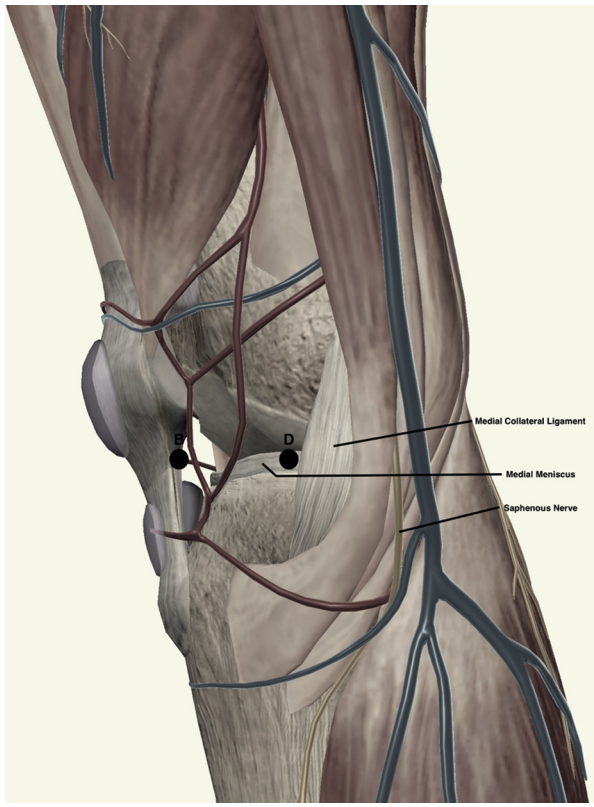


**Fig 6.** Medial view of the right knee demonstrating anteromedial (B) and medial submeniscal (D) portals, with anatomic considerations labeled.

## Anatomic Considerations

With any surgical approach, the anatomic relations of nearby structures need to be considered. With the lateral approach, one must consider the relation between the lateral meniscus, lateral collateral ligament (LCL), popliteus tendon, lateral inferior geniculate

**Table 1.** Advantages and Risks of Submeniscal Portal

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|---|
| Advantages |
| • Easier access to the inferior leaflet of the meniscus |
| • More thorough debridement of the inferior leaflet |
| Risks |
| • Iatrogenic injury to surrounding soft tissue structures (lateral inferior geniculate artery, LCL, MCL, common peroneal nerve, saphenous nerve) |
| • Iatrogenic injury to articular cartilage |
| • Recurrent hemarthrosis |
| • Synovial cutaneous fistula |

LCL, lateral collateral ligament; MCL, medial collateral ligament.

artery, and common peroneal nerve (Fig 5).[4,5] The LCL and popliteus tendon are narrow tubular structures that are often palpable and easily avoided; however, iatrogenic injuries to these structures are possible.[4,5] The lateral inferior genicular artery passes underneath the origin of the gastrocnemius, deep to the LCL at the level of the joint, and passed over the lateral limb of the arcuate ligament and the lateral meniscus.[4,5] An unrecognized injury to this artery can cause recurrent hemarthrosis.[4,5] The common peroneal nerve descends obliquely along the lateral aspect of the knee toward the fibular head.[4,5]

With the medial approach, one must consider the relation among the medial meniscus, medial collateral ligament, and the infrapatellar branch of the saphenous nerve (Fig 6).[6,7] The medial collateral ligament is a flatter and wider structure than the LCL and may be injured with the medial submeniscal approach; therefore, this approach may be contraindicated with an associated medial collateral ligament injury.[6,7] The infrapatellar branch of the saphenous nerve has a highly variable course and may be at risk with access to the medial aspect of the knee.[6,7]

## Discussion

Horizontal cleavage tears of the body or anterior horns of the menisci can be difficult to treat through standard anteromedial or anterolateral portals. Since these tears are not amendable to repair, the treatment of choice is either a partial meniscectomy or subtotal meniscectomy.[1,2] Goals of a meniscectomy are to remove unstable fragments, smooth any sudden contour changes of the meniscus rim, and to leave as much healthy meniscus as possible.[1,2] To achieve these goals, the surgeon needs easy access to the tear site.

Other authors have described 3 portal techniques using a probe (Kim and Park[8]) or a small skin hook retractor (Na et al.[3]) to retract the superior leaf in order to aid in the debridement of the inferior leaflet of the horizontal tear. Our proposed technique uses a 4.0-mm shaver through a submeniscal portal that allows easier access and a more thorough debridement of the inferior leaflet of horizontal cleavage tears of either the medial or lateral meniscus (Fig 4). Additionally, our proposed technique allows for decompression of the parameniscal cyst wall though an outside-in approach. Although our proposed technique has advantages, there are also risks involved, as stated in Table 1; however, we do not consider these risks as more significant than standard arthroscopy.[1-3,8,9]

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